



Service Manual

STEREO AMPLIFIER

SA-708

 **PIONEER®**

MODEL SA-708 COMES IN FOUR VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
HR	220V and 240V (Selectable)	U.K. and Oceania model
HA	220V and 240V (Selectable)	Europe model
S	110V, 120V, 220V, and 240V (Switchable)	General export model
S/G	110V, 120V, 220V, and 240V (Switchable)	U.S. Military model

- This service manual is applicable to the HR and HA types. When repairing the S and S/G types, please see the additional service manual (ART-368).

CONTENTS

1. SPECIFICATIONS	3	6. PARTS LOCATION	10
2. FRONT PANEL FACILITIES	4	7. ADJUSTMENTS	12
3. BLOCK DIAGRAM	6	8. EXPLODED VIEW	13
4. CIRCUIT DESCRIPTIONS		9. SCHEMATIC DIAGRAM, P.C. BOARD PATTERNS AND PARTS LIST	
4.1 Phono Circuit	6	9.1 Miscellanea	15
4.2 Tone Controls	6	9.2 Schematic Diagram	16
4.3 Power Amplifier	6	9.3 P.C. Board Connection Diagram	19
4.4 Indicator Circuit	7	9.4 Parts List of P.C. Board Assemblies	23
4.5 Protection Circuit	8	10. PACKING	25
5. DISASSEMBLY	9	11. SUPPLEMENTS FOR HA TYPE	25

LINE VOLTAGE SELECTION

HR type; Line voltage is factory adjusted at 240V.

HA type; Line voltage is factory adjusted at 220V.

Line voltage can be changed with following steps.

1. Disconnect the power cord.
2. Remove the top cover (refer to page 9).
3. Reset the fuse (2.5A) on the Fuse assembly to the correct place (see Fig. 1).
4. Stick the line voltage label on the rear panel.

Part No.	Description
AAX-193	220V label
AAX-192	240V label

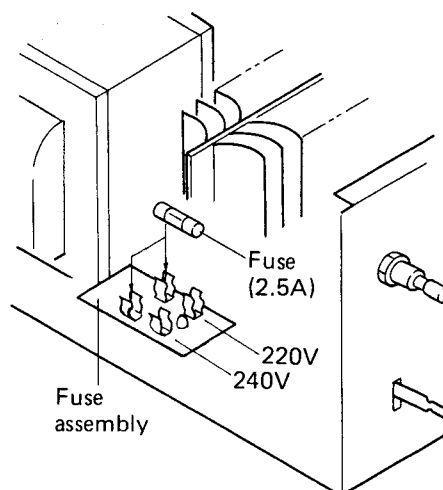


Fig. 1

1. SPECIFICATIONS

Semiconductors

ICs	3
FETs	2
Transistors	41
Diodes	31

Amplifier Section

Continuous Power Output of 65 watts* per channel, min., at 8 ohms from 20 Hertz to 20,000 Hertz with no more than 0.02 % total harmonic distortion or 65 watts per channel at 4 ohms from 20 Hertz to 20,000 Hertz with no more than 0.03 % total harmonic distortion.

Continuous Power Output at 1kHz (both channels driven)

T.H.D. 0.02%, 8 ohms 70 watts per channel

Total Harmonic Distortion (20 Hertz to 20,000Hertz, 8 ohms, from AUX)

continuous rated power output . . . No more than 0.02%

32.5 watts per channel power output

..... No more than 0.02%

1 watt per channel power output . . . No more than 0.02%

Intermodulation Distortion (50 Hertz: 7,000 Hertz = 4:1, 8 ohms, from AUX)

continuous rated power output . . . No more than 0.02%

32.5 watts per channel power output

..... No more than 0.02%

1 watt per channel power output . . . No more than 0.02%

Damping Factor

(20 Hertz to 20,000 Hertz, 8 ohms) 35

Input (Sensitivity/Impedance)

PHONO 2.5mV/50kilohms

TUNER 150mV/50kilohms

AUX 150mV/50kilohms

TAPE PLAY 1, 2 150mV/50kilohms

TAPE PLAY 2 (DIN connector) . . . 150mV/50kilohms

Phono Overload Level (T.H.D. 0.01%, 1kHz)

PHONO 200mV

Output (Level/Impedance)

TAPE REC 1 150mV/1kilohm

TAPE REC 2 150mV/1kilohm

TAPE REC 2 (DIN connector) . . . 30mV/80kilohms

Speaker A, B, A+B (4 – 16ohms)

Frequency Response

PHONO (RIAA Equalization)

..... 20Hz to 20,000Hz ± 0.2 dB

TUNER, AUX, TAPE PLAY

..... 10Hz to 50,000Hz ± 1 dB

Tone Control

BASS +7.5dB, -7.5dB (100Hz)

TREBLE +7.5dB, -7.5dB (10,000Hz)

Subsonic Filter 15Hz (-6dB/oct)

Loudness Contour (Volume control set at -40dB

position) +6dB (100Hz), +3dB (10,000Hz)

Hum and Noise (IHF, short-circuited, A network)

PHONO 86dB

TUNER, AUX, TAPE PLAY 100dB

Hum and Noise (DIN continuous power/50mW)

PHONO 70dB/60dB

TUNER, AUX, TAPE PLAY 86dB/61dB

Muting -20dB

Miscellaneous

Power Requirements

HA model 220V, 50/60Hz

HR model 240V, 50/60Hz

S, S/G models 110V/120V/220V/240V, 50/60Hz

Power Consumption

HA, HR models 600W

S, S/G models 190W

Dimensions 420(W) x 150(H) x 337(D) mm

16-9/16(W) x 5-7/8(H) x 13-1/4(D) in

Weight (without package) 9.7kg (21 lb. 6 oz)

Furnished Parts

Operating instructions 1

Fuse 2.5A (S, S/G models only) 1

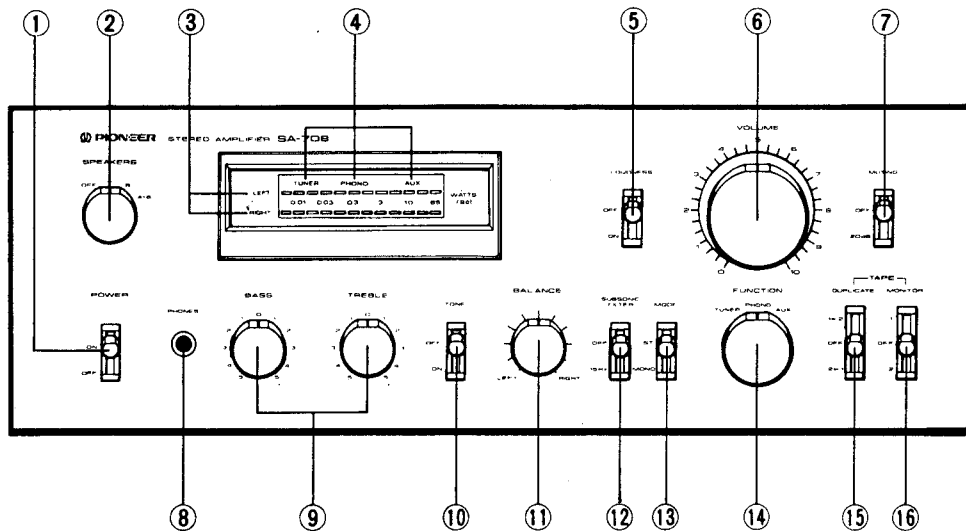
Fuse 5A (S, S/G models only) 1

NOTE:

Specifications and the design subject to possible modifications without notice due to improvements.

* Measured pursuant to the Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifiers.

2. FRONT PANEL FACILITIES



① POWER SWITCH

Set this switch to ON to supply power to the amplifier. There will be a short delay when it is set to ON, because the muting circuit has been actuated to suppress the unpleasant noise that is sometimes generated when the power is on and off.

② SPEAKER SELECTOR

Use this selector to select the speaker systems.

OFF: Sound not obtained from speakers.

A: Sound obtained from speakers connected to the A speaker terminals.

B: Sound obtained from speakers connected to the B speaker terminals.

A+B: Sound obtained from speakers connected to both A and B speaker terminals.

③ POWER METER

This meter allows you to read out the rated power level on the fluorescent display tube when speakers with a nominal impedance of 8 ohms are connected to the amplifier's speaker terminals.

④ FUNCTION INDICATORS

The TUNER, PHONO, AUX function indicators light up in accordance with the position of the function selector.

NOTE:

The function indicator will not go off when the tape monitor switch is set to position "1" or "2".

⑤ LOUDNESS SWITCH

When listening to a performance with the volume control turned down, set this switch to ON and the bass and treble will be accentuated.

When the volume is low, the human ear finds it harder to hear the bass and treble than when the volume is high. The loudness switch is thus designed to compensate for this deficiency. By setting it to ON, the bass and treble come through much more strongly and the sound takes on a punch even when the volume control is turned down.

⑥ VOLUME CONTROL

Use this control to adjust the output level to the speakers and headphones. Turn it clockwise to increase the output level. No sound will be heard if you set it to "0"

⑦ MUTING SWITCH

Set this switch to -20dB to attenuate the audio output by 20dB. There is no need to adjust the volume control if you use this switch when turning down the audio output temporarily and when changing over records or tapes.

⑧ HEADPHONE JACK

Plug the headphones into this jack when you want to listen through your stereo headphones.

NOTE:

Set the speaker selector to OFF when listening only with headphones.

⑨ BASS AND TREBLE CONTROLS

Use these controls to adjust the bass and the treble. If you set the tone switch to ON and turn the bass control to right from its center position, you will be able to emphasize the sound in the low-frequency range. Conversely, turning the bass control to the left from the center position, you will attenuate the sound.

You can use the treble control to adjust the sound in the high-frequency range.

⑩ TONE SWITCH

Set this switch to ON when adjusting the bass and treble controls. When set to OFF, the tone control circuits are disengaged and frequency response is flat. This function is convenient for checking phono cartridge and speaker tone quality and listening room acoustics.

⑪ BALANCE CONTROL

Use this control to balance the volume of the left and right channels. First, however, set the mode selector to MONO, and adjust so that the sound appears to come from somewhere exactly between the two speakers. If the sound appears to be louder on the right, it means that the volume of the right channel is higher. Turn the balance control to the left and adjust.

Conversely, if the sound appears to be louder on the left, it means that the volume of the left channel is higher. Therefore, turn the balance control to the right and adjust. After adjusting, return the mode selector to ST.

⑫ SUBSONIC FILTER SWITCH

When this switch is set to the 15Hz position, the subsonic filter with a cut-off frequency of 15Hz is actuated. The subsonic filter serves to attenuate frequencies lower than 15Hz in a 6dB/oct slope. It is therefore effective in suppressing ultra-low-frequency noise which is generated by record warp and other causes. You cannot actually hear this noise but it is a factor in the generation of intermodulation distortion and it may damage your speaker system. Set this switch to the 15Hz position during record play for the best effect.

⑬ MODE SELECTOR

Use this selector for selecting the performances.

ST: Set to this position for normal stereo reproduction.

MONO: Mixes left and right channel signals and reproduces them monophonically.

⑭ FUNCTION SELECTOR

Use this selector to select the program source. When set, the function indicator above the meter panel corresponding to the position of the function selector will light up.

TUNER: Set here when listening to broadcasts on a tuner connected to the TUNER jacks. (The TUNER function indicator lights up.)

PHONO: Set here when playing records on a turntable connected to the PHONO jacks. (The PHONO function indicator lights up.)

AUX: Set here when listening to a program source which is connected to the AUX jacks. (The AUX function indicator lights up.)

⑮ TAPE DUPLICATE SWITCH

Use this switch when employing two tape decks to duplicate recorded tapes or edit tapes. This switch is otherwise kept at the OFF position.

1►2: When playing back the tape on a deck connected to the TAPE 1 jacks and recording (duplicating) on a deck connected to the TAPE 2 jacks.

OFF: Set to this position when not duplicating.

2►1: When playing back the tape on a deck connected to the TAPE 2 jacks and recording (duplicating) on a deck connected to the TAPE 1 jacks.

⑯ TAPE MONITOR SWITCH

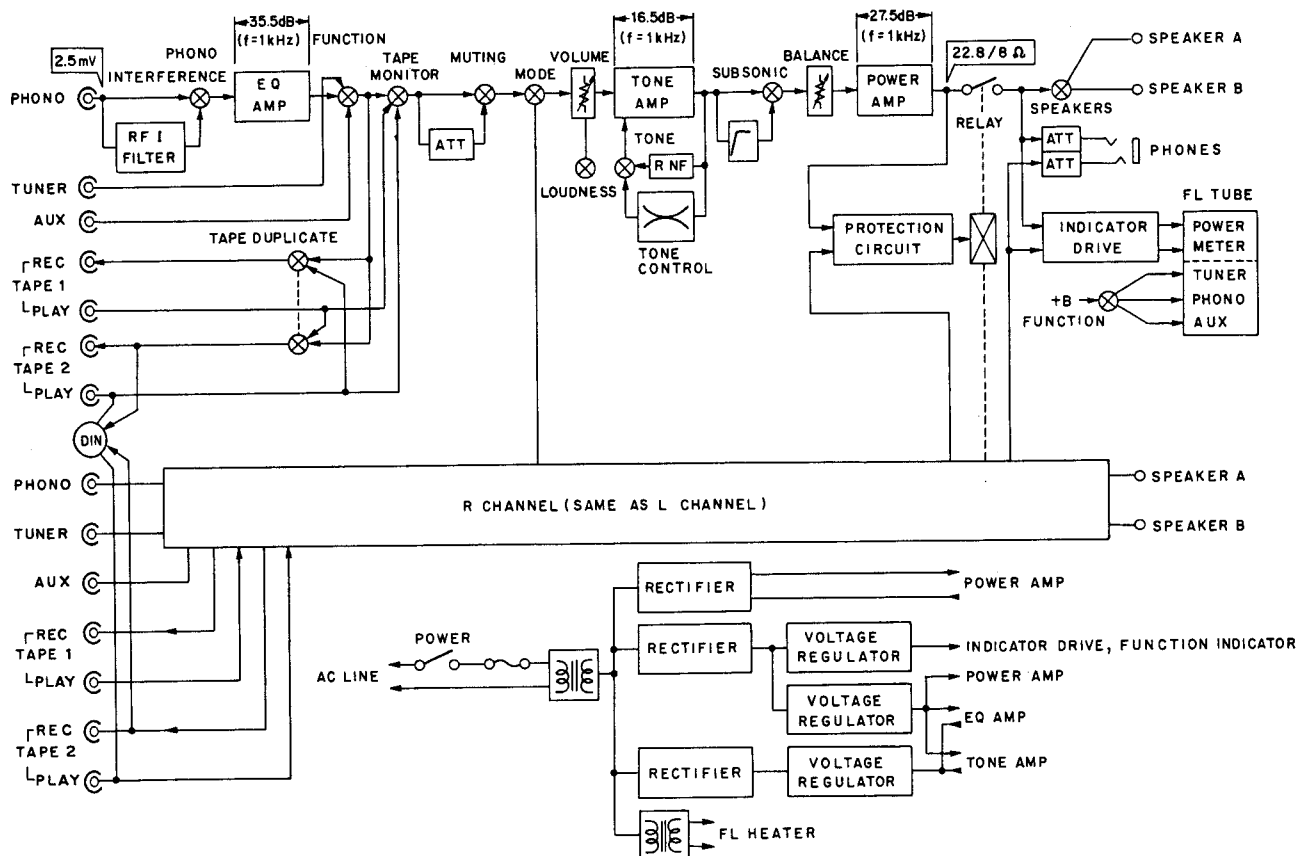
Use this to select the program source which is being reproduced.

1: Set here to monitor a recording or a tape being played back on a tape deck which is connected to the TAPE 1 jacks.

OFF: Set here whenever you are not playing back a tape or monitoring a recording (i.e. when you have set the function selector to PHONO or TUNER, or AUX for an alternative program source).

2: Set here to monitor a recording or a tape being played back on a tape deck which is connected to the TAPE 2 jacks.

3. BLOCK DIAGRAM



4. CIRCUIT DESCRIPTIONS

4.1 PHONO CIRCUIT

RF Interference Filter

Since the phono input circuit is extremely sensitive, it is adversely affected by radio frequency interference. This interference is reduced by inserting a resistor in series with the phono input circuit by setting the PHONO INTERFERENCE FILTER switch on the rear panel to the ON position.

Equalizer Amplifier

The equalizer amplifier is a 3-stage direct-coupled amplifier with emitter-to-emitter feedback. An S-N ratio of 86dB (at 2.5mV input, IHF-A, PHONO INTERFERENCE FILTER switch OFF) has been achieved by using an ultra-low-noise PNP transistor (2SA978) at the first stage, and reducing the signal source resistance and equalizer element impedance.

The 2nd stage load has been reduced, a large

output voltage obtained, and the output impedance lowered by using an emitter follower at the output stage.

Metal film resistors having a tolerance of $\pm 1\%$ and polypropylene film capacitors having a tolerance of $\pm 2\%$ are used on the NFB circuit to obtain an equalizer deviation of within $\pm 0.2\text{dB}$ over the 20Hz to 20000Hz range. The maximum allowable input of this circuit is 200mV (at 1kHz, THD 0.01%).

4.2 TONE CONTROLS

The tone amplifier is a 3-stage direct-coupled amplifier with emitter-to-emitter feedback.

Tone control (BASS, TREBLE) is accomplished by providing the tone amplifier NFB circuit with a frequency characteristic. The NFB circuit is changed to a flat frequency characteristic when the TONE switch is in the OFF position.

4.3 POWER AMPLIFIER

The first stage is a differential amplifier formed by twin transistor, while the load circuit forms a current mirror circuit. The current mirror serves to make this stage operate in push-pull mode, thereby eliminating the even numbered harmonics, and doubling the gain.

The pre-driver stage is a Darlington connection, while the load circuit forms a constant-current source, thereby obtaining a high voltage gain.

The power stage is a Darlington connection pure-complementary SEPP circuit, employing an high speed transistor. The high speed transistor is a kind of IC consisting of a number of small transistor being connected in parallel via an emitter resistor. This provides excellent high frequency characteristics comparable to those of a small-signal transistor. Furthermore, because there is no time constant in the NFB circuit in the low-frequency region, amplification is possible down to DC (DC inputs will be cut off, however, by the input coupling capacitor of the power amplifier.).

The circuit features described above provide an extremely wide power frequency range (65W + 65W, 20Hz to 20kHz, THD 0.02%, 8 Ω).

4.4 INDICATOR CIRCUIT

The SA-708 output power and function indicators feature fluorescent indicator tube (FL tube). In this tube, thermionic emissions from the cathode are accelerated into the fluorescent substance of the segmental anodes, resulting in the emission of light. This tube is used to indicate numerals, letters, and other symbols.

An outline of the FL tube drive circuit is shown in Fig. 4-1. The output circuit signal is applied to pin no. 6 (4) of the IC (TA7318P-A). The IC contains a detector circuit, compressor (40dB), and peak hold circuit for both left and right channels. The dynamic range of the signal is thus contracted by 40dB to obtain a "peak held" DC voltage.

The output power indicator segments of the FL tube are driven by the HA12010 ICs (one for each channel) equipped with 12 pairs of differential amplifiers. These amplifiers are biased at increasing levels, so each amplifier will commence to operate separately as the input level increases. And since these amplifiers apply the voltages to the output power indicator segments, each successive segment will light up in turn as the input level rises.

The function indicators are lit up as a result of a voltage being applied to the corresponding function indicator segment according to the selected positions of the FUNCTION switch.

4.5 PROTECTION CIRCUIT

The purpose of this circuit is to protect the speakers and the power amplifier. The relay in the output circuit is automatically opened in any of the following cases;

1. During the "transient operations" when the power supply is turned on and off.
2. Upon detection of an overload caused by a short circuit in the load.
3. Upon detection of a DC voltage in the output caused by component failure or accident.

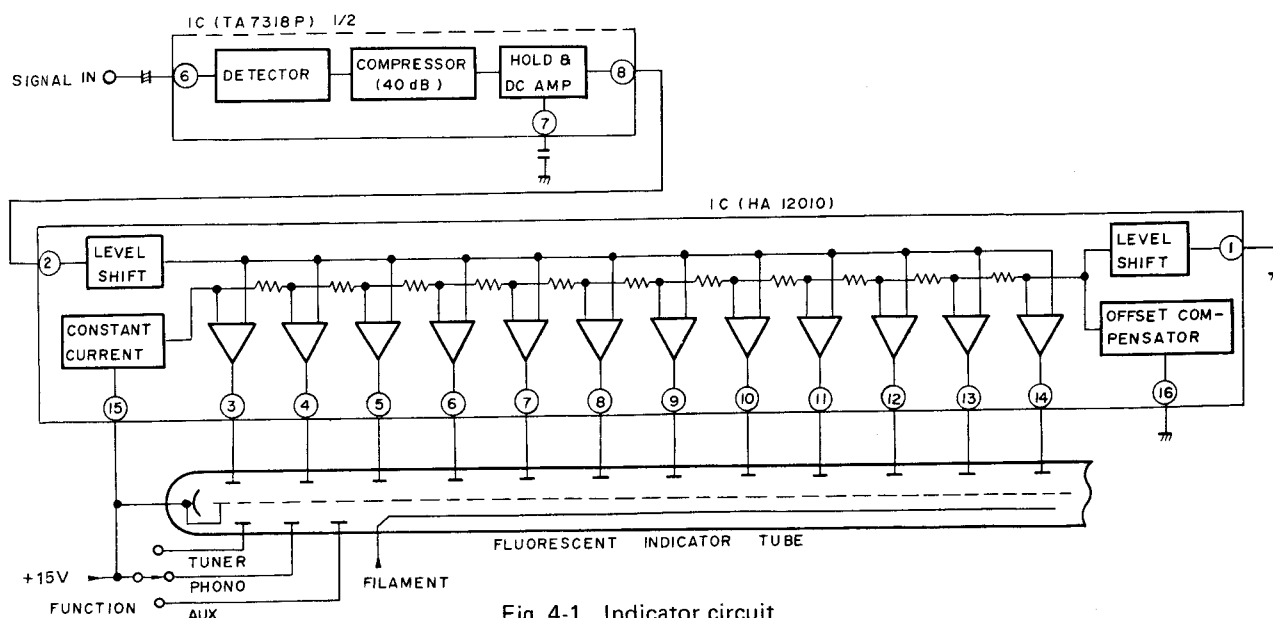


Fig. 4-1 Indicator circuit

Muting Operation When Power Supply is Turned On and Off

With reference to Fig. 4-2 when the power supply is turned on, Q_2 turns off due to $+B_1$ and $+B_2$. If there is no input (DC) on Q_4 and Q_5 , they will be off, and the timing capacitor C_2 charges up through R_3 and D_3 and thus Q_3 turns on. When Q_3 conducts, the relay operates, and the output muting on the power amplifier will be removed.

When the power supply is turned off, $+B_2$ will abruptly decay, and Q_2 will conduct owing to the residual component of $+B_1$. As a result, C_2 will rapidly discharge, Q_3 will cease to conduct, whereupon the relay will become de-energized and restore muting.

Overload Detector

The overload detector circuit incorporates the load (R_L) in one side of a Wheatstone bridge (see Fig. 4-3). The base and emitter of a sensing transistor (Q_1) are connected to the opposite corners of the bridge, so if R_L decreases, Q_1 will become forward biased. If R_L falls below a prescribed value, Q_1 will turn on, thereby passing a current through R_3 and D_2 . Due to the voltage difference generated across R_3 , Q_2 will become forward biased, and consequently turn on. C_2 will rapidly discharge. As consequence, Q_3 will turn on and the relay will become de-energized, thus causing the output circuit to open.

DC Voltage Detector

The output circuit is connected to the Q_5 emitter and Q_4 base via a low-pass filter (R_4 , C_3). Any DC voltages appearing at the output circuit of the power amplifier, will be applied to the Q_5 emitter and the Q_4 base. If the voltage is negative, Q_5 turns on. Due to the voltage difference generated across R_3 , Q_2 will become forward biased, and consequently turn on. C_2 will rapidly discharge. If the voltage is positive, Q_4 and Q_2 turns on. C_2 will rapidly discharge. As consequence, Q_3 will turn on and the relay will become de-energized, thus causing the output circuit to open.

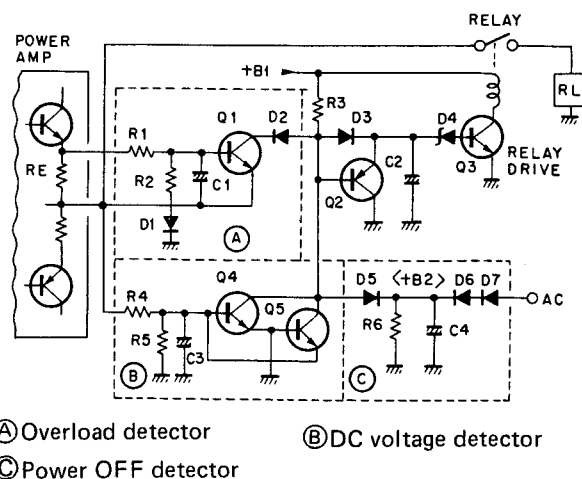


Fig. 4-2 Protection circuit

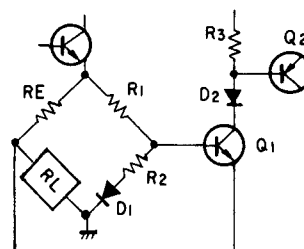


Fig. 4-3 Overload detector

5. DISASSEMBLY

Top Cover

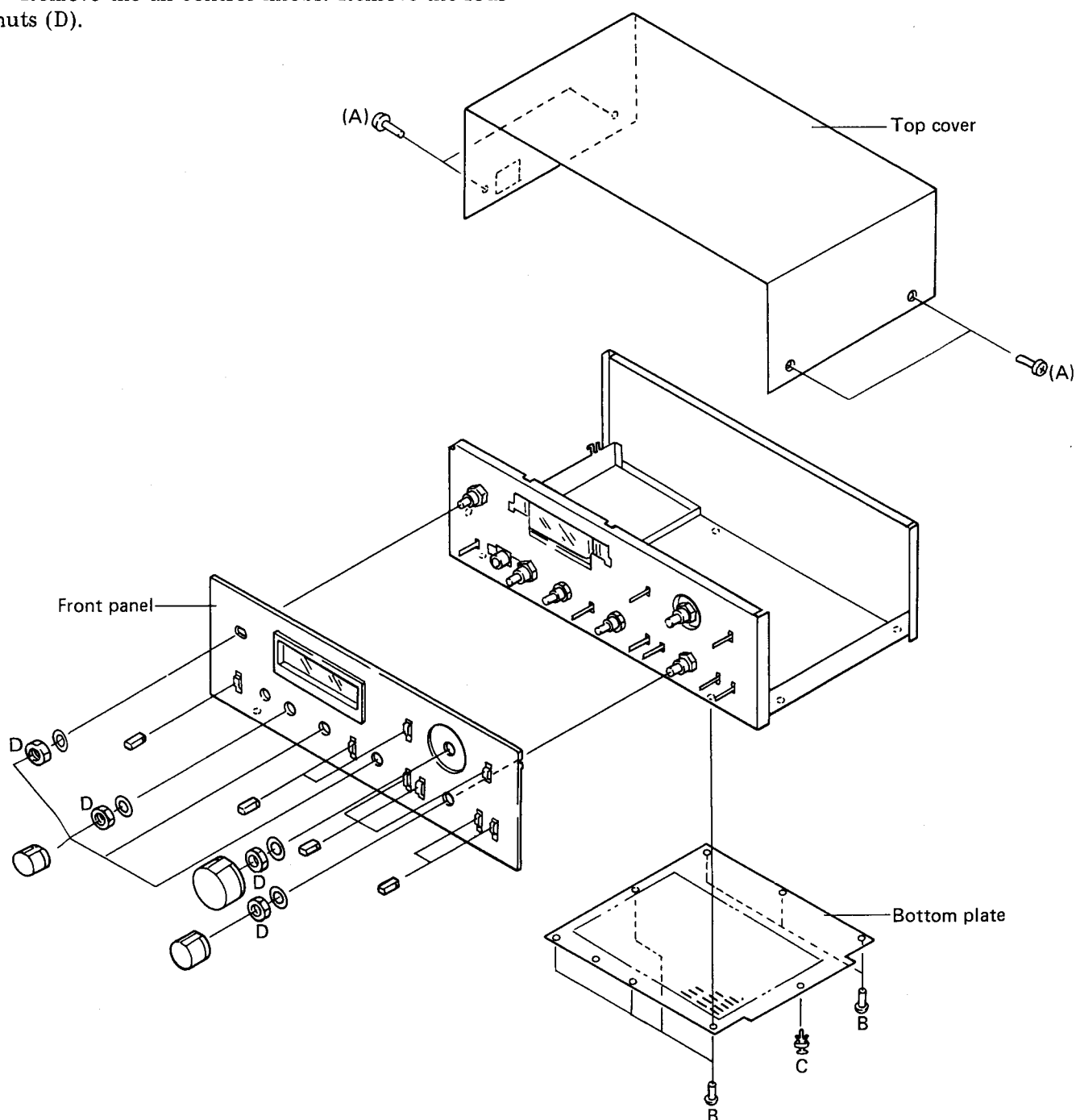
Remove the two screws (A) on each side of the top cover.

Bottom Plate

Remove the seven screws (B) and the rivet (C) to detach the bottom plate.

Front Panel

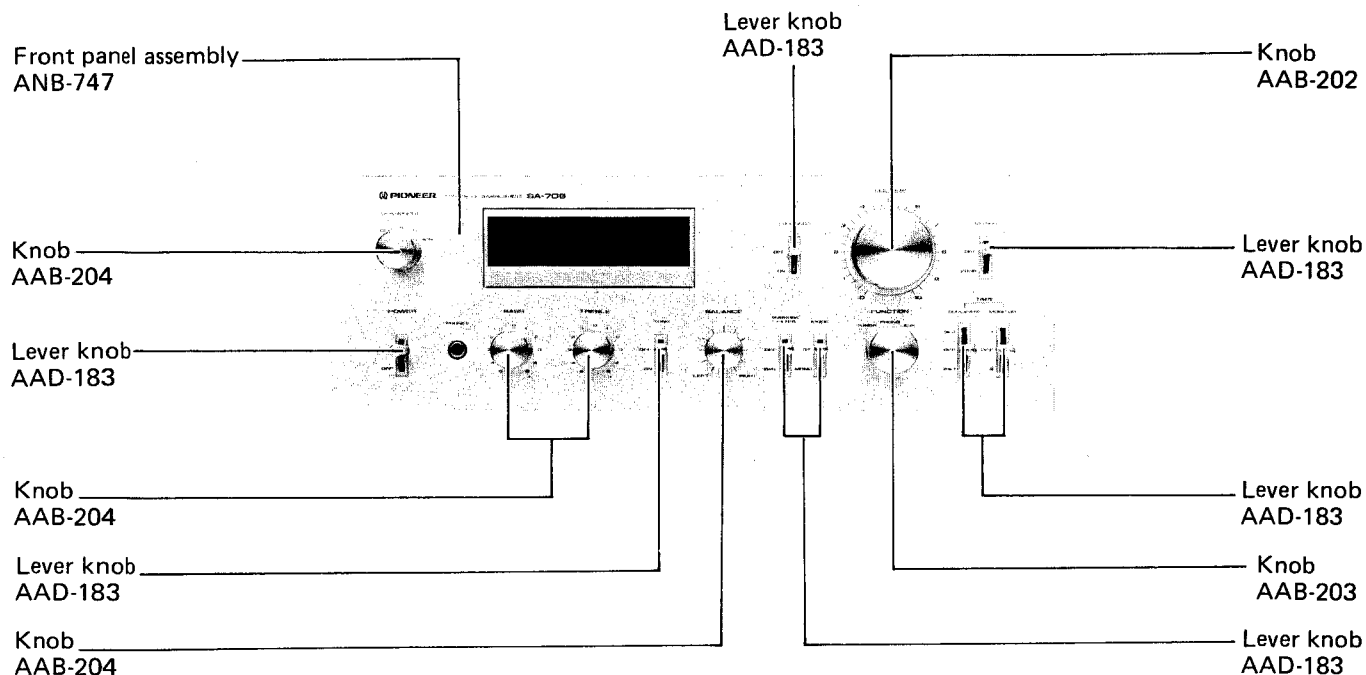
Remove the all control knobs. Remove the four nuts (D).



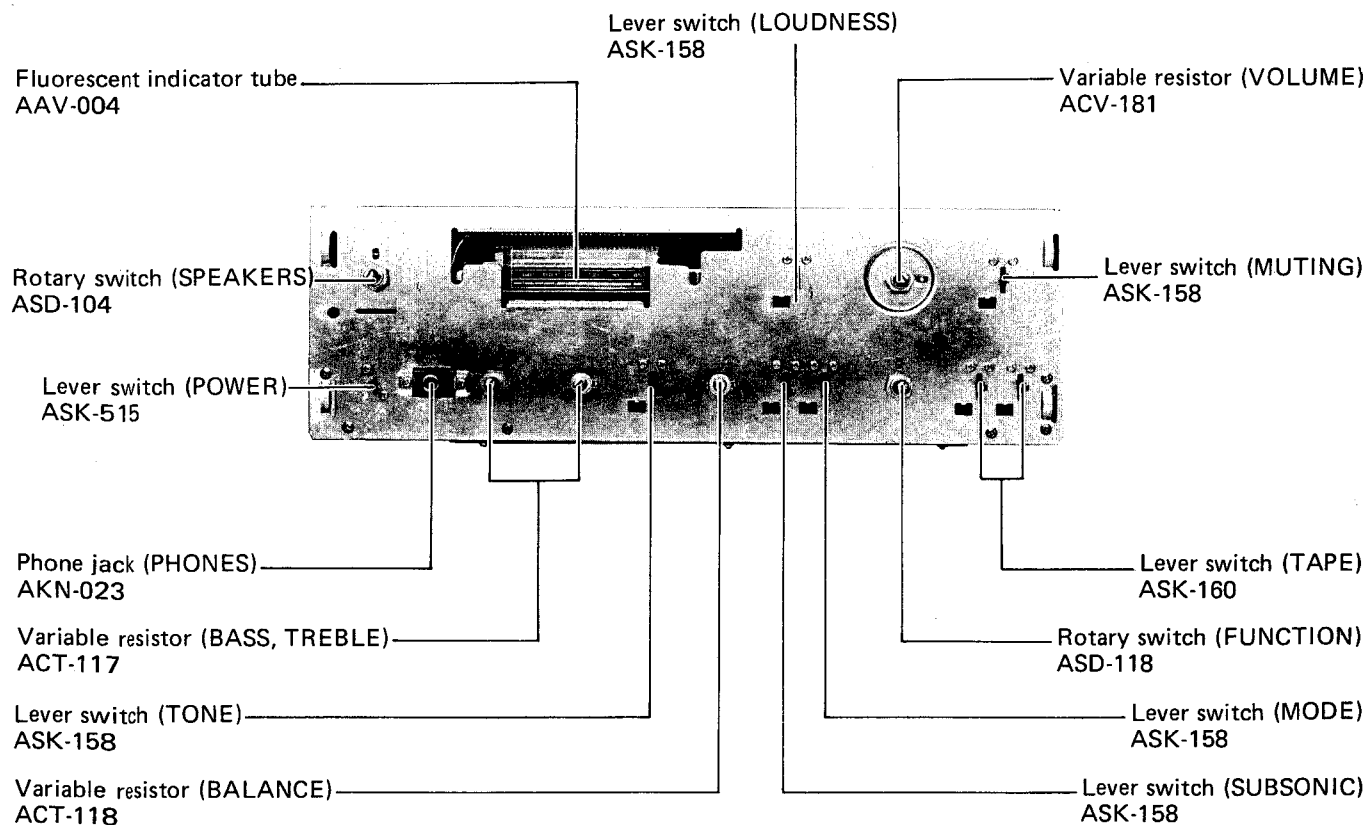
6. PARTS LOCATION

- The Δ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

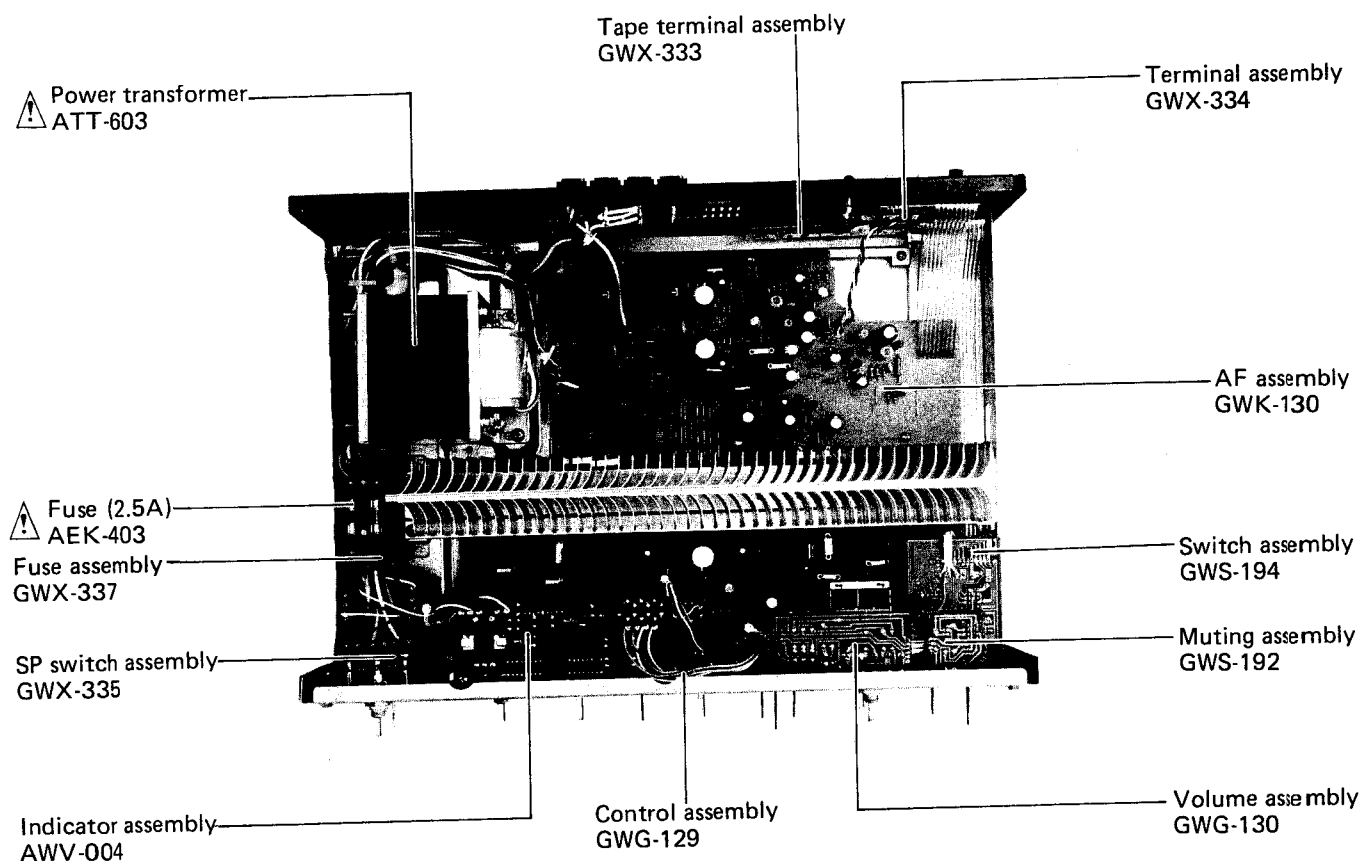
Front Panel View



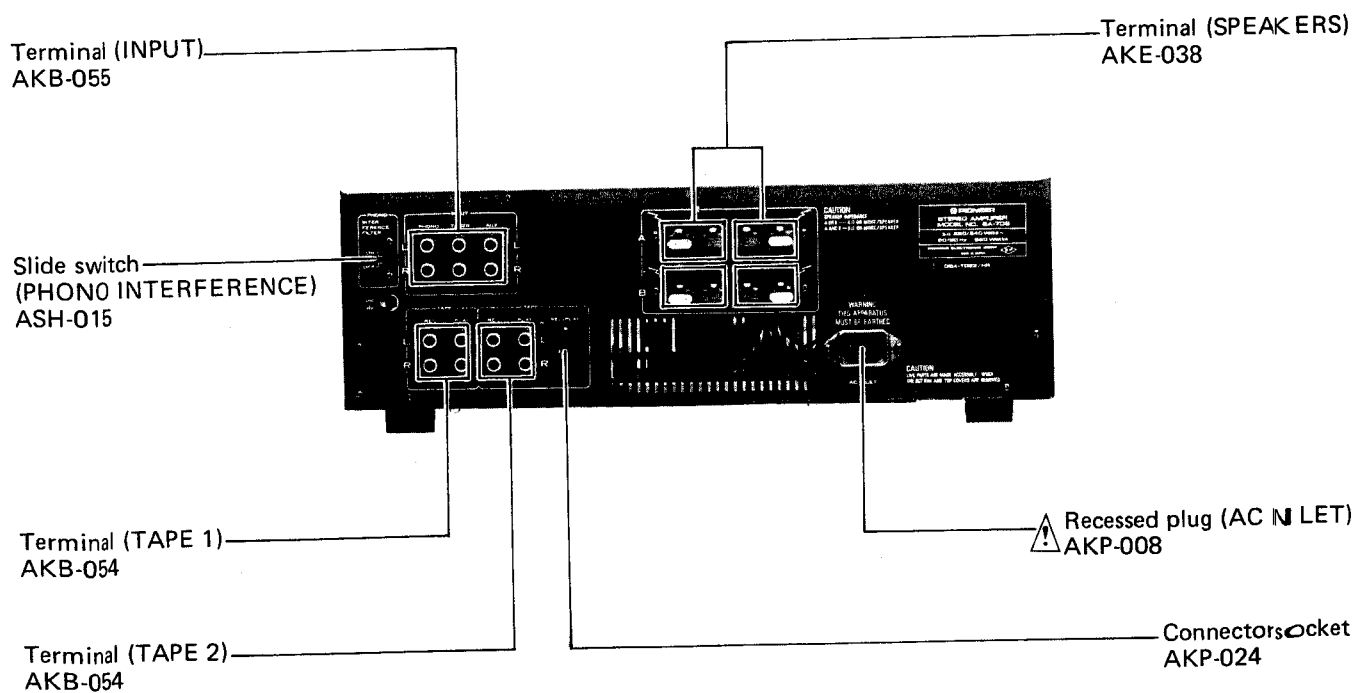
Front View with Panel Removed



Top View



Rear Panel View



7. ADJUSTMENTS

Idle Current Adjustment

1. Turn the VOLUME control down to minimum level, turn the power on, and wait about 10 minutes.
2. Connect a DC voltmeter to the TP terminals (L ch; TP4 $\oplus$ and TP3 $\ominus$, R ch; TP1 $\oplus$ and TP2 $\ominus$) of the GWK-130.
3. Check that the voltage between TP4 and TP3 (L ch) lies within the DV DC 4mV–50mV range. Then make a similar check for the R ch (between TP3 and TP4). If the voltage is less than 4.4mV, cut jumper A (L ch), and jumper B (R ch). If the voltage exceeds 50mV, check for circuit failure.

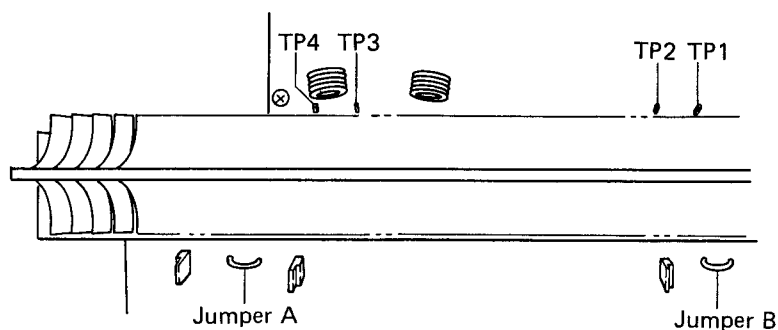


Fig. 7-1

Output Indicator Adjustment

1. Set the TONE switch OFF position.
2. Set the SPEAKERS selector to the A position, and connect an 8Ω resistor and AC voltmeter to the speaker output terminals.
3. Set the FUNCTION switch to the AUX position, and apply a 1kHz, 150mV signal to the AUX input terminals.
4. Adjust the VOLUME control so that the voltage on the output terminals (SPEAKERS) read 9V (AC).
5. Adjust VR1 (L ch) and VR2 (R ch) of the indicator assembly so that the output power indicator read 10 watts.

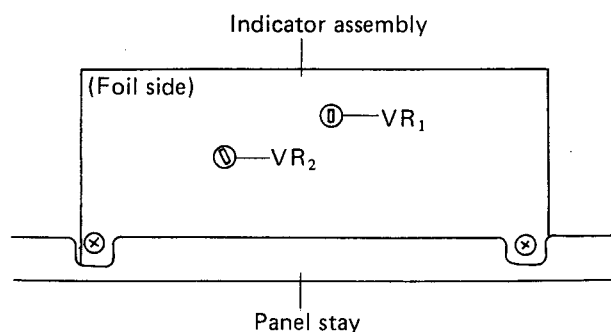
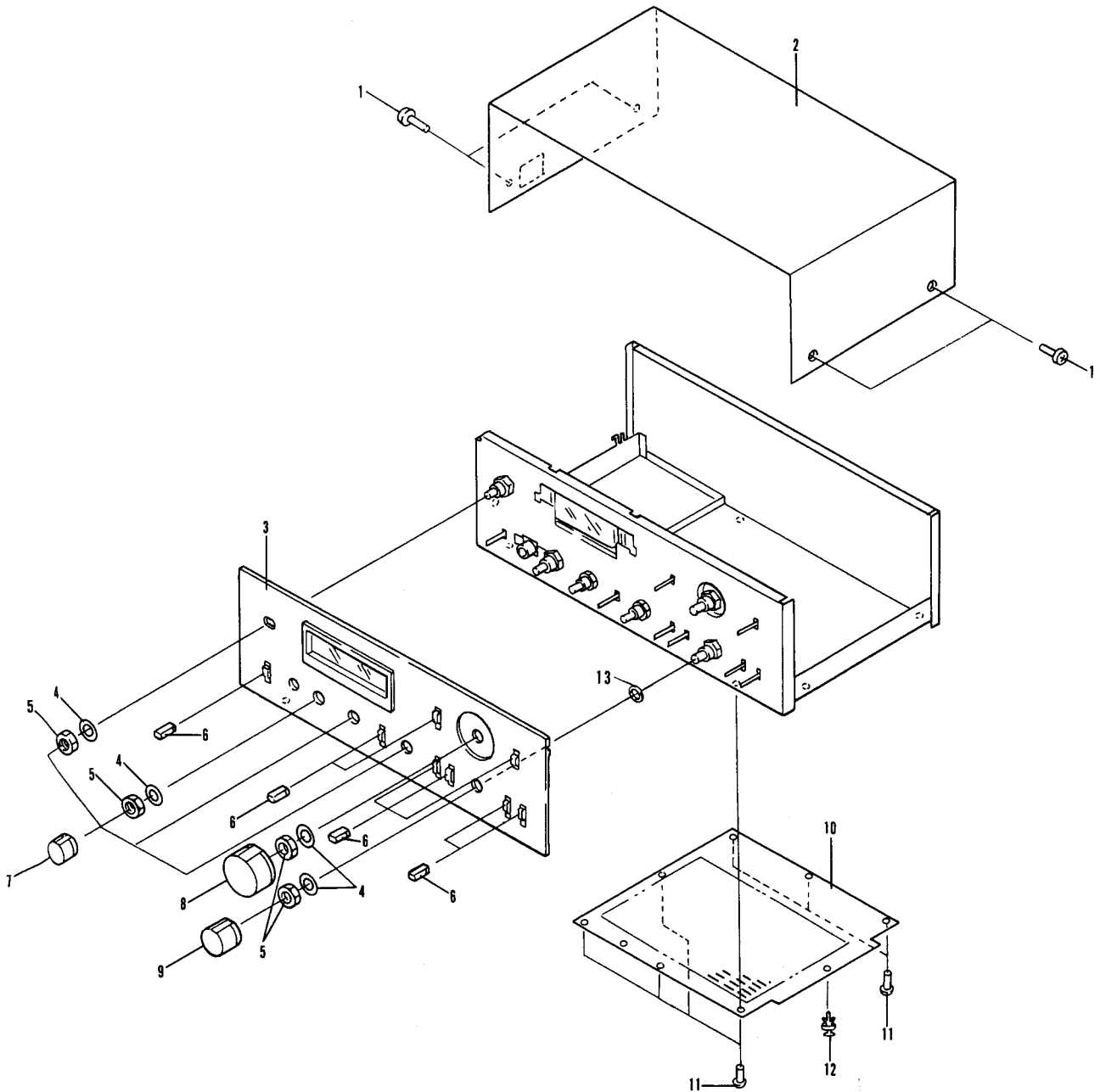


Fig. 7-2

8. EXPLODED VIEW

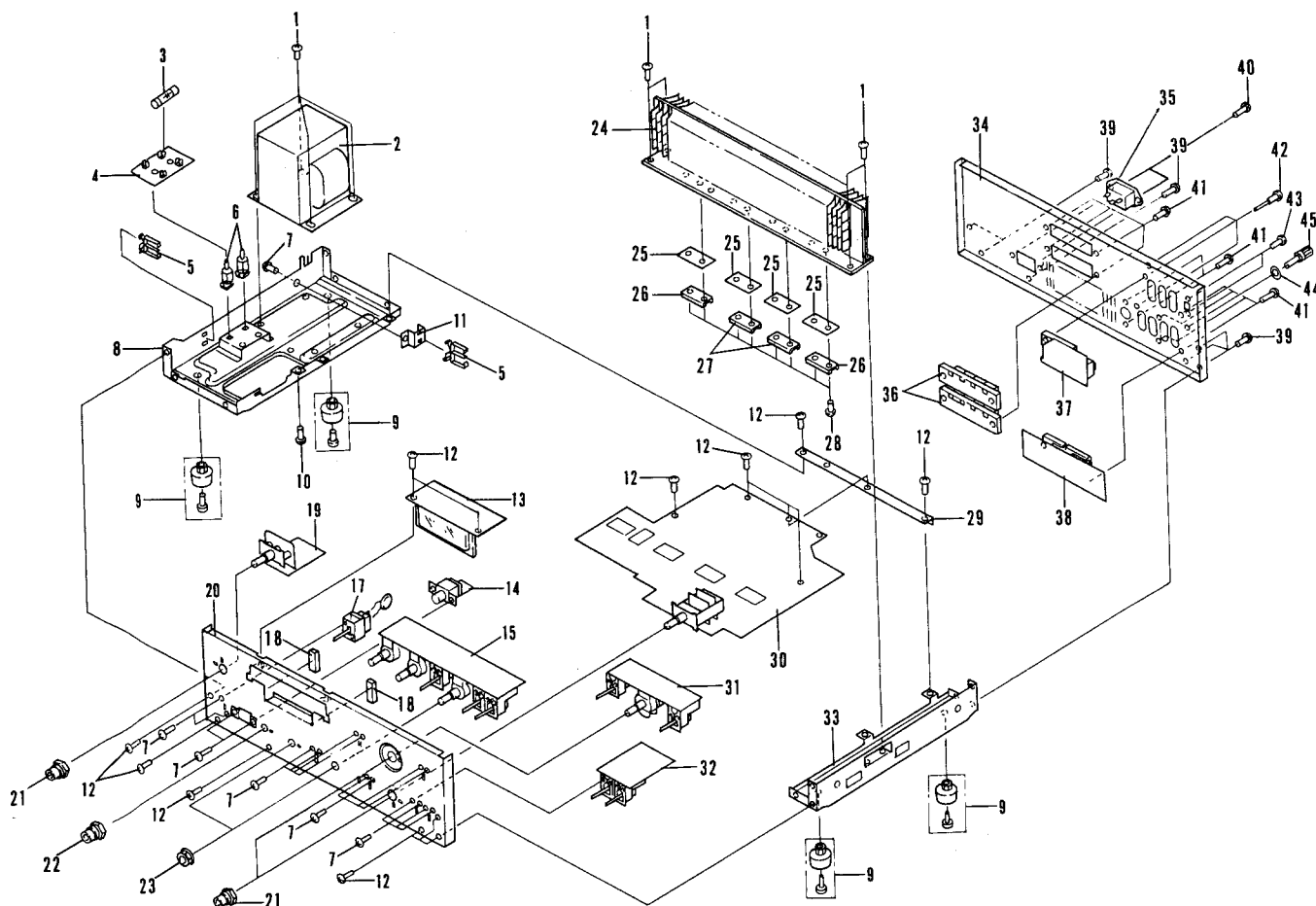


NOTE:

- Parts without part number cannot be supplied.
- The  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

Key No.	Part No.	Description
1.	ABA-079	Screw 4x8
2.	ANE-235	Top cover
3.	ANB-747	Front panel assembly
4.	M45-086	Washer
5.	B71-004	Nut M9
6.	AAD-183	Lever knob

Key No.	Part No.	Description
7.	AAB-204	Knob
8.	AAB-202	Knob
9.	AAB-203	Knob
10.		Bottom plate
11.	ABA-048	Screw 3x6
12.	AEC-525	Rivet
13.	B22-017	Washer



Key No.	Part No.	Description	Key No.	Part No.	Description
1.	ABA-069	Screw 4x8	25.	AEC-488	Insulator spacer
⚠ 2.	ATT-603	Power transformer	26.	2SC2525/A/-G	Transistor
⚠ 3.	AEK-403	Fuse (2.5A)	27.	2SA1075/A/-G	Transistor
4.	GWX-337	Fuse assembly	28.	ABA-208	Screw 3x12
5.		Wire saddle	29.		Frame
6.		P.C. Board holder	30.	GWK-130	AF assembly
7.	ABA-025	Screw 3x4	31.	GWG-130	Volume assembly
8.		Frame	32.	GWS-194	Switch assembly
9.	AEC-446	Foot assembly	33.		Frame
10.	ABA-069	Screw 4x8	34.		Rear panel
11.		Angle	⚠ 35.	AKP-008	Recessed plug (AC INLET)
12.	ABA-048	Screw 3x6	36.	AKE-038	Terminal (SPEAKERS)
13.	AWV-004	Indicator assembly	37.	GWX-334	Terminal assembly
14.	GWX-336	Headphone assembly	38.	GWX-333	Tape terminal assembly
15.	GWG-129	Control assembly	39.	ABA-228	Screw 3x6
16.			40.	ABA-057	Screw 3x8
⚠ 17.	ASK-515	Lever switch (POWER)	41.	ABA-157	Screw 3x8
18.		Cushion	42.	ABA-115	Screw 3x10
19.	GWX-335	SP switch assembly	43.	ABA-116	Screw 3x6
20.		Panel stay	44.	ABE-005	Washer
21.	ABN-050	Union nut	45.		Terminal (GND)
22.	ABN-049	Union nut			
23.	ABN-031	Nut M7			
24.		Heat sink			

15

4

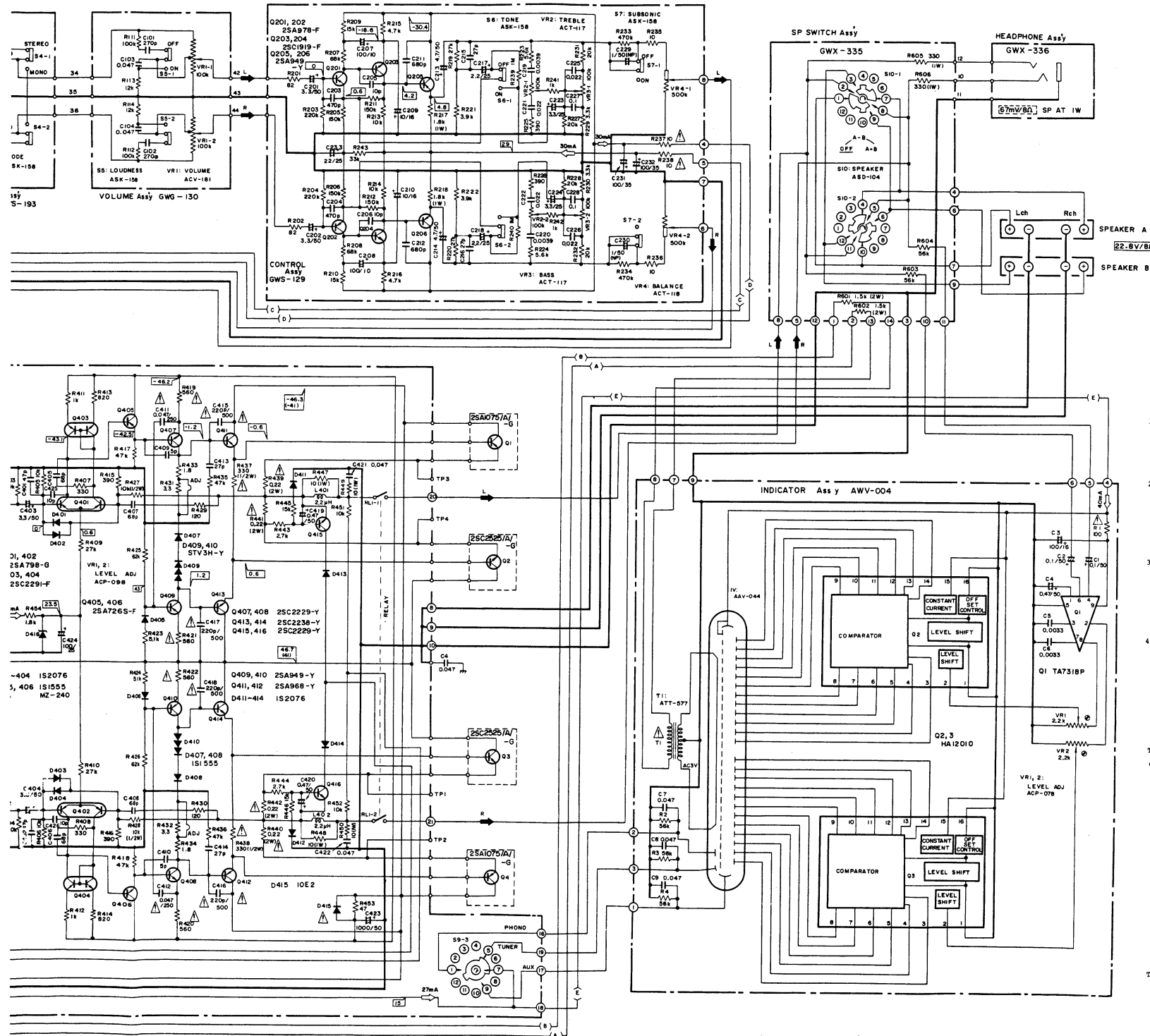
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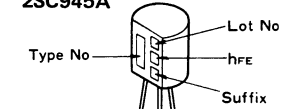
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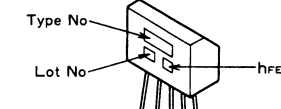


External Appearance of Transistors and ICs

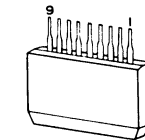
2SA733A
2SC945A



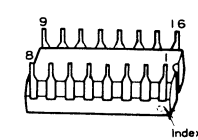
2SA798



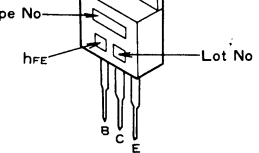
TA7318P



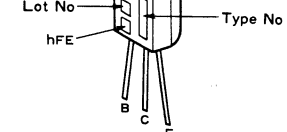
HA12010



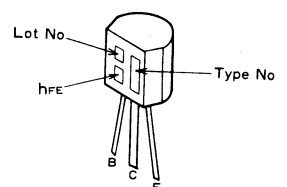
2SA968
2SC2238
2SD313



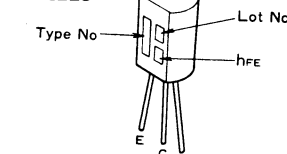
2SA904A
2SC1914A



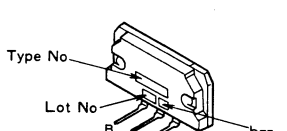
2SA905



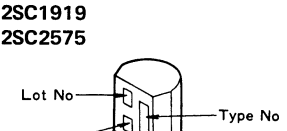
2SA949
2SC2229



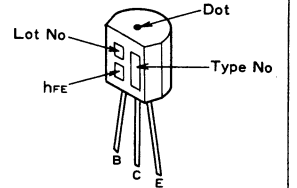
2SA1075/A/
2SC2525/A/



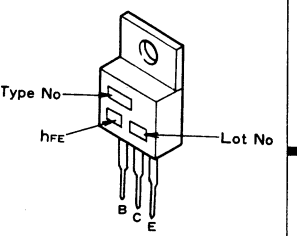
2SA978
2SA1100
2SC1919
2SC2575



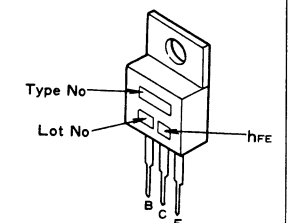
2SA726S



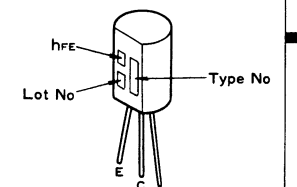
2SB507



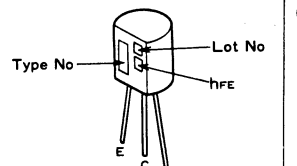
2SB682
2SD712



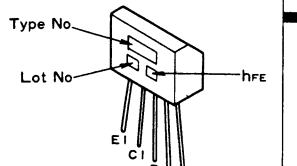
2SC1384



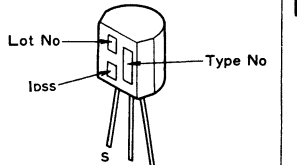
2SC1400



2SC2291



2SK34



- RESISTORS:
Indicated in Ω , 1/4W, 5% tolerance unless otherwise noted
k:K Ω , M:M Ω , (F): μ F, (G): μ G, (K): μ K tolerance
- CAPACITORS:
Indicated in capacity(μ F)/voltage(V) unless otherwise noted p:pF
Indication without voltage is 50V except electrolytic capacitor.
- VOLTAGE, CURRENT:
 $\square$ V: Signal voltage at 65W + 65W 80 output(1kHz)
 $\square$ V: DC voltage(V) at no input signal
Value in () is DC voltage at rated power.
 $\square$ mA: DC current at no input signal
- OTHERS:
 $\rightarrow$: Signal route
 $\odot$: Adjusting point

The Δ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation. This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

SWITCHES

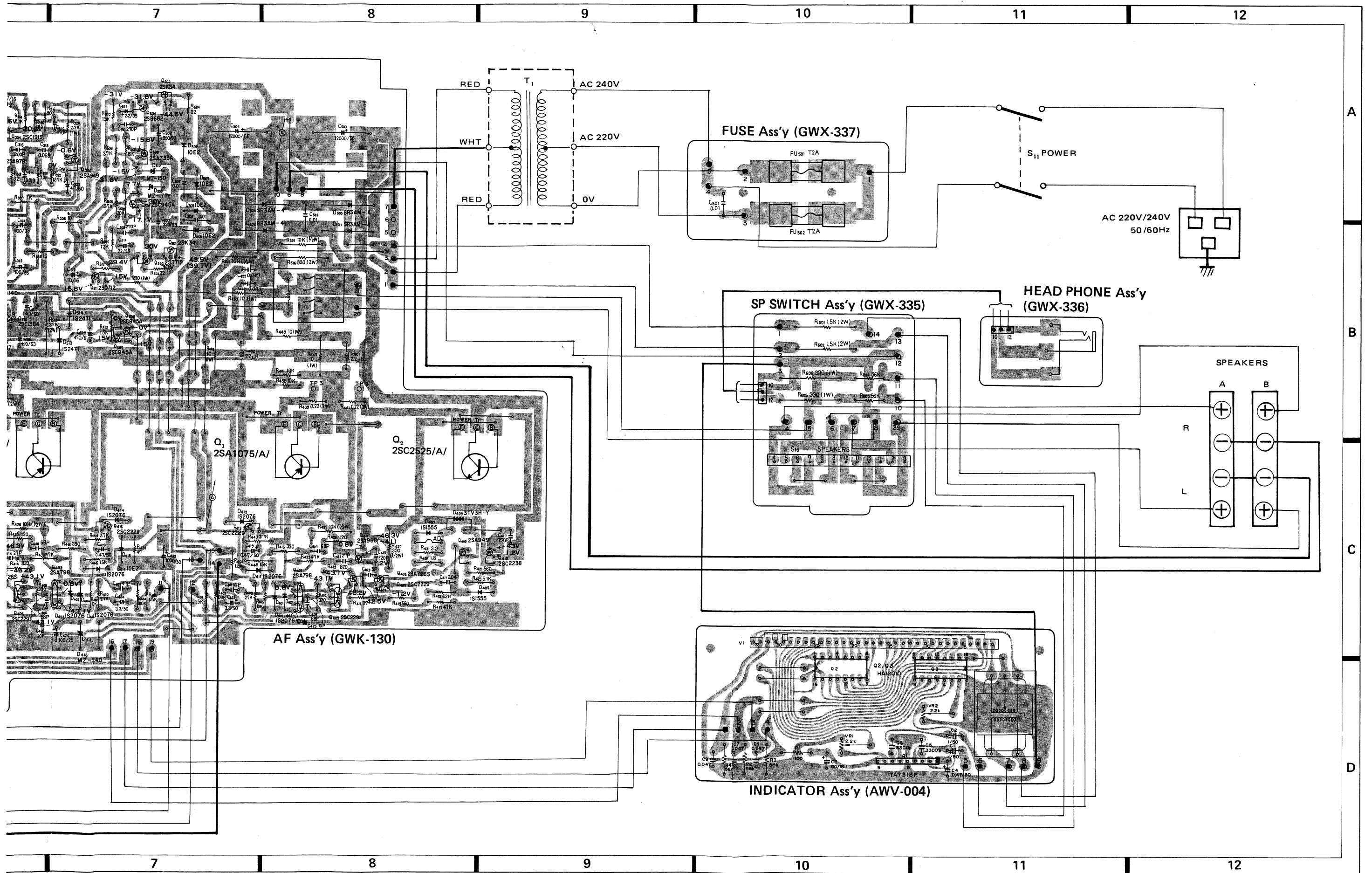
- | | |
|-----------------------|-----------------|
| S1 TAPE DUPLICATE | 1-2-SOURCE-2-1 |
| S2 TAPE MONITOR | 1-OFF-2 |
| S3 MUTE | OFF - -20dB |
| S4 MODE | STEREO-MONO |
| S5 LOUDNESS | OFF-ON |
| S6 TONE | OFF-ON |
| S7 SUBSONIC | OFF-ON |
| S8 PHONO INTERFERENCE | OFF-ON |
| S9 FUNCTION | TUNER-PHONO-AUX |
| S10 SPEAKERS | OFF-A-B-A+B |
| S11 POWER | OFF-ON |

The underlined indicates the switch position.

1	2	3	4	5	6	
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D



9.4 PARTS LIST OF P.C. BOARD ASSEMBLIES

AF Assembly (GWK-130)

CAPACITORS

Part No.	Symbol & Description
ACH-212	C503, C504
ACG-004	C502, C505, C506
CCDSL 050D 50	C311, C312, C409, C410
CCDSL 270K 50	C413, C414
CCDSL 470K 50	C401, C402
CCDSL 680K 50	C405, C406, C407, C408
CCDSL 221K 500	C415-C418
CKDYB 471K 50	C305, C306, C319, C320
CQMA 473J 50	C421, C322
CQMA 473J 250	C411, C412
CCDSL 100K 50	C425, C426
CQSA 271J 50	C301, C302, C509, C510
CQSA 122G 50	C315, C316
CQPA 183G 50	C313, C314
CQPA 683G 50	C317, C318
CEANL 3R3M 50	C303, C304, C403, C404
CEANLNP 4R7M 50	C321, C322
CEANL 470M 16	C307, C308
CEANL 470M 35	C325
CEA 010P 50	C517
CEA 2R2P 35	C511, C512
CEA R47P 50	C419, C420
CEA 100P 16	C513
CEA 100P 63	C516
CEA 101P 16	C515
CEA 101P 25	C424
CEA 101P 35	C323, C324
CEA 331P 63	C507, C508
CEA 471P 6	C309, C310, C514
CEA 102P 50	C423

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

RESISTORS

Part No.	Symbol & Description
RD¼PM □□□ J	R303-R316, R325-R334, R337, R401-R404, R407-R418, R423-R426
RD¼PM □□□ J	R429-R436, R443-R446, R451-R454, R503-R510
RD¼PM □□□ J	R512-R514
RD¼PM □□□ J	R419-R422
RN¼SQ □□□□ F	R317-R322
RS1P □□□ J	R323, R324, R447-R450, R511
RD¼PM □□□ J	R335, R336
RD½PS □□□ J	R427, R428, R501, R502
ACN-030	R439-R442
RS2P □□□ J	R515, R516
RD½PSF □□□ J	R437, R438

SEMICONDUCTORS

Part No.	Symbol & Description
2SA978	Q301, Q302
2SC1919	Q303, Q304
(2SC1400)	
2SA949	Q305, Q306, Q409, Q410
2SA798-G	Q401, Q402
2SC2291	Q403, Q404
2SA726S	Q405, Q406
2SC2229	Q407, Q408, Q415, Q416
* 2SA968-Y or O	Q411, Q412
* 2SC2238-Y or O	Q413, Q414
* hfe of Q411-Q414 should have the same value.	
2SK34	Q501, Q502
2SD712	Q503, Q511
(2SD313)	
2SB682	Q504
(2SB507)	
2SC945A	Q505, Q507, Q508
(2SC2575)	
2SA733A	Q506
(2SA1100)	
2SA904A	Q509
2SC1384	Q510
1S2076	D401-D404, D411-D414
(1S1555)	
1S1555	D405-D408
STV3H-Y	D409, D410
10E2	D415, D505-D508
(SIB01-02)	
MZ-240	D416
(WZ-240)	
SR3AM-4	D501-D504
MZ-177	D509
(WZ-177)	
MZ-150	D510
(WZ-150)	
1S2471	D511-D514
MZ-140	D515
(WZ-140)	

OTHERS

Part No.	Symbol & Description
ASD-118	S9 Rotary switch (FUNCTION)
ASR-023	RL1 Relay

Control Assembly (GWG-129)

CAPACITORS

Part No.	Symbol & Description
CCDSL 100D 50	C205, C206
CCDSL 270K 50	C215, C216
CKDYB 681K 50	C211, C212
CQMA 392J 50	C219, C220
CQMA 223J 50	C221, C222, C225, C226
CQMA 104J 50	C227, C228
CEA 100P 16	C209, C210
CEA 220P 25	C233
CEA 101P 10	C207, C208
CEA 101P 35	C231, C232
CEANLNP 010M 50	C229, C230
CEANL 2R2M 25	C217, C218
CEANL 3R3M 25	C223, C224
CEANL 3R3M 50	C201, C202
CEANL 4R7M 50	C213, C214

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

RESISTORS

Part No.	Symbol & Description
RD $\frac{1}{4}$ PM $\square\square\square$ J	R201–R207, R213, R214, R219–R236, R241–R243
RD $\frac{1}{4}$ VS $\square\square\square$ J	R208–R212, R215, R216, R239, R240
RS1P $\square\square\square$ J	R217, R218
Δ RD $\frac{1}{4}$ PM $\square\square\square$ J	R237, R238
ACT-117	VR2, VR3 Variable (BASS, TREBLE)
ACT-118	VR4 Variable (BALANCE)

SEMICONDUCTORS

Part No.	Symbol & Description
2SA978	Q201, Q202
2SC1919 (2SC1400)	Q203, Q204
2SA949 (2SA905)	Q205, Q206

SWITCH

Part No.	Symbol & Description
ASK-158	S6, S7 Lever (TONE, SUBSONIC)

Mode Assembly (GWS-193)

Part No.	Symbol & Description
RD $\frac{1}{4}$ PM 332J	R109, R110
ASK-158	S4 Lever switch (MODE)

SP Switch Assembly (GWX-335)

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Part No.	Symbol & Description
RS2P $\square\square\square$ J	R601, R602
RD $\frac{1}{4}$ PM $\square\square\square$ J	R603, R604
RS1P $\square\square\square$ J	R605, R606
ASD-104	S10 Rotary switch (SPEAKERS)

Headphone Assembly (GWX-336)

Part No.	Symbol & Description
AKN-023	Phone jack (PHONES)

Fuse Assembly (GWX-337)

Part No.	Symbol & Description
Δ ACG-001	C501

Terminal Assembly (GWX-334)

Part No.	Symbol & Description
RD $\frac{1}{4}$ PM 222J	R301, R302
ASH-015	S8 Slide switch (PHONE INTERFERENCE)
AKB-055	Terminal (INPUT)

Tape Terminal Assembly (GWX-333)

Part No.	Symbol & Description
RD $\frac{1}{4}$ PM 394J	R101, R102
RD $\frac{1}{4}$ PM 104J	R103, R104
AKB-054	Terminal (TAPE)
AKP-024	Connector socket

Switch Assembly (GWS-194)

Part No.	Symbol & Description
ASK-160	S1 Lever switch (DUPLICATE)
ASK-160	S2 Lever switch (TAPE MONITOR)

Muting Assembly (GWS-192)

Part No.	Symbol & Description
RD $\frac{1}{4}$ PM 562J	R107, R108
RD $\frac{1}{4}$ PM 473J	R105, R106
ASK-158	S3 Lever switch (MUTING)

Indicator Assembly (AWV-004)

CAPACITORS

Part No.	Symbol & Description
CEANL 0R1M 50	C1, C2
CEA 101P 16	C3
CEA R47P 50	C4
CQMA 332K 50	C5, C6
CKDYF 473Z 50	C7—C9

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

RESISTORS

Part No.	Symbol & Description
RD%PMF □□□ J	R1
RD%PM □□□ J	R2—R4
ACP-078	VR1, VR2

SEMICONDUCTORS

Part No.	Symbol & Description
TA7318P-A	Q1
HA12010	Q2, Q3

OTHERS

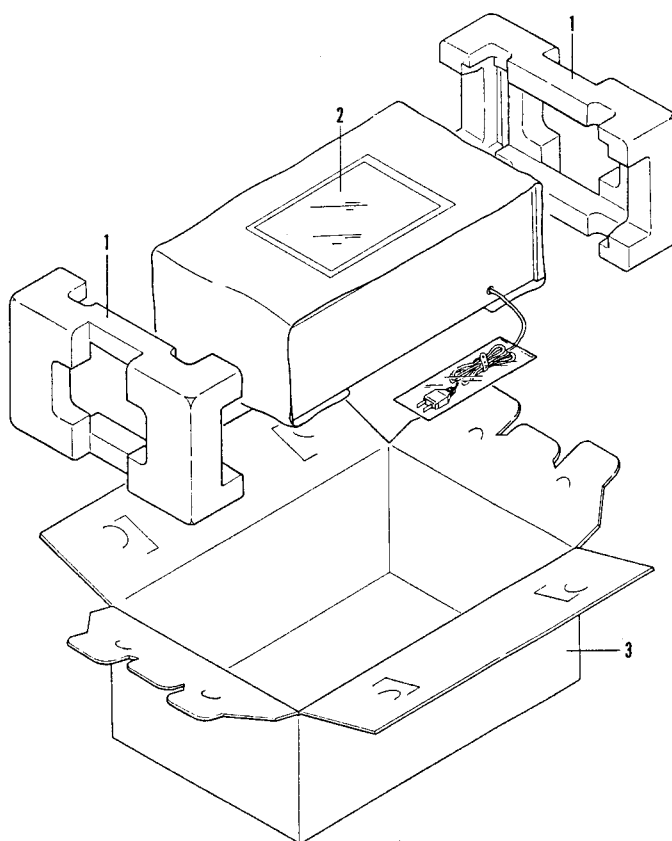
Part No.	Symbol & Description
AAV-004	V1 Fluorescent indicator tube
△ ATT-577	T1 Heater transformer

10. PACKING

Key No.	Part No.	Description
1.	AHA-187	Side pad
2.	ARB-328	Operating instructions (ENGLISH)
3.	AHD-698	Packing case

Volume Assembly (GWG-130)

Part No.	Symbol & Description
ACV-181	VR1 Variable resistor (VOLUME)
RD%PM 104J	R111, R112
RD%PM 123J	R113, R114
CCDSL 271K 50	C101, C102
CQMA 473J 50	C103, C104
ASK-158	S5 Lever switch (LOUDNESS)



11. SUPPLEMENTS FOR HA TYPE

Model SA-708/HA is the same as the SA-708/HR with exception of description in this supplements.

Contrast of Miscellaneous Parts

Symbol	Description	Part No.		Remarks
		HR type	HA type	
△	AC socket (AC OUTLETS) Operating instructions (GERMAN/FRENCH)		AKP-026 ARD-137	